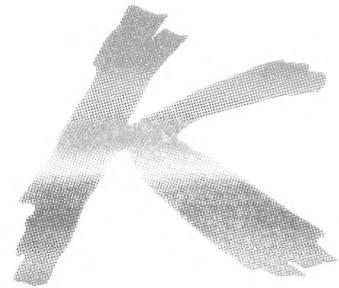


WILDLIFE WILDERNESS WILDERNESS

SEPTEMBER • OCTOBER 1996





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ZOO GOER

VOLUME 25 • NUMBER 5 • SEPTEMBER • OCTOBER 1996

To get fantastic footage, wildlife filmmakers can risk life and limb.



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of the
National**



is a nonprofit organization of individuals, families, and organizations who are interested in helping to maintain the status of the National Zoological Park as one of the world's great zoos, to foster its use for education, research, and recreation, to increase and improve its facilities and collections, and to advance the welfare of its animals.

ZooGoer [ISSN 0163-416X] is published bimonthly by Friends of the National Zoo to promote its aims and programs, and to provide information about FONZ activities to its members, volunteers, and others interested in the purposes of FONZ. Third class mailing permit no. 6282. Copyright 1996, Friends of the National Zoo. All rights reserved.

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WILDLIFE ART FESTIVAL

People have been depicting animals in their art for at least 20,000 years. In fact, wildlife predominates in the paintings of the first known human artists, whose work survives in the caves where these ancient humans sheltered. In this issue of *ZooGoer*, we explore some modern manifestations of wildlife in art.

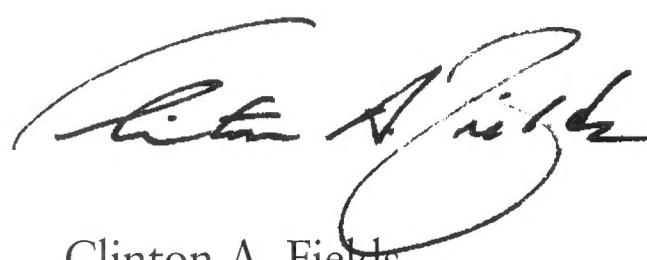
First, we offer a selection of paintings and sculptures by just a few of the nearly 100 wildlife artists whose works will appear at the Friends of the National Zoo Wildlife Art Festival. These artists are among the best in the area of wildlife art today and we are proud to have them participating in the festival. In only its second year, our Wildlife Art Festival has gained a national reputation for excellence, and it is also raising significant and much-needed funds for Zoo education and conservation programs.

Next, we look at a relatively new way that artists depict animals—filmmaking. Wildlife films give viewers a window into the natural world, taking us to places most will never visit, and allowing us to see rare and unusual behaviors. The article by Lily Whiteman reveals how wildlife filmmakers capture such scenes and weave them together to tell compelling—and accurate—stories about wild animals. Finally, Pamela M. Henson discusses wildlife art in the service of science, where accuracy in every detail is paramount. Though scientific illustrators often depict smaller and less glamorous creatures than other wildlife artists do, they are able to uncover beauty even in cockroaches and mosquitoes.

Whatever the medium, wildlife art encourages us to look more closely at the natural world around us, and allows us to glimpse faraway corners of the natural world. Zoos do much the same thing. It's not surprising that many wildlife artists look to zoo animals for inspiration and for the opportunity to get near enough to a wild animal to discern the details of its form. The Zoo thus is a perfect venue for a wildlife art festival, bringing together animals, art, and the people who admire both. Moreover, the festival proceeds support the conservation of endangered wildlife, helping to ensure that the beauty inherent in all animals survives in reality as well as on canvas and film.

The FONZ Wildlife Art Festival is the weekend of September 21 and 22, with a pre-festival Patron's Preview Party and Auction on Friday evening, September 20. I hope you will attend some or all of the festival's events, which include art activities for kids as well as a wine tasting for adults. Look for details in Notes & News (page 29) and in your recent *Wildlife Adventures*. I look forward to seeing you.

Sincerely,



Clinton A. Fields
Executive Director



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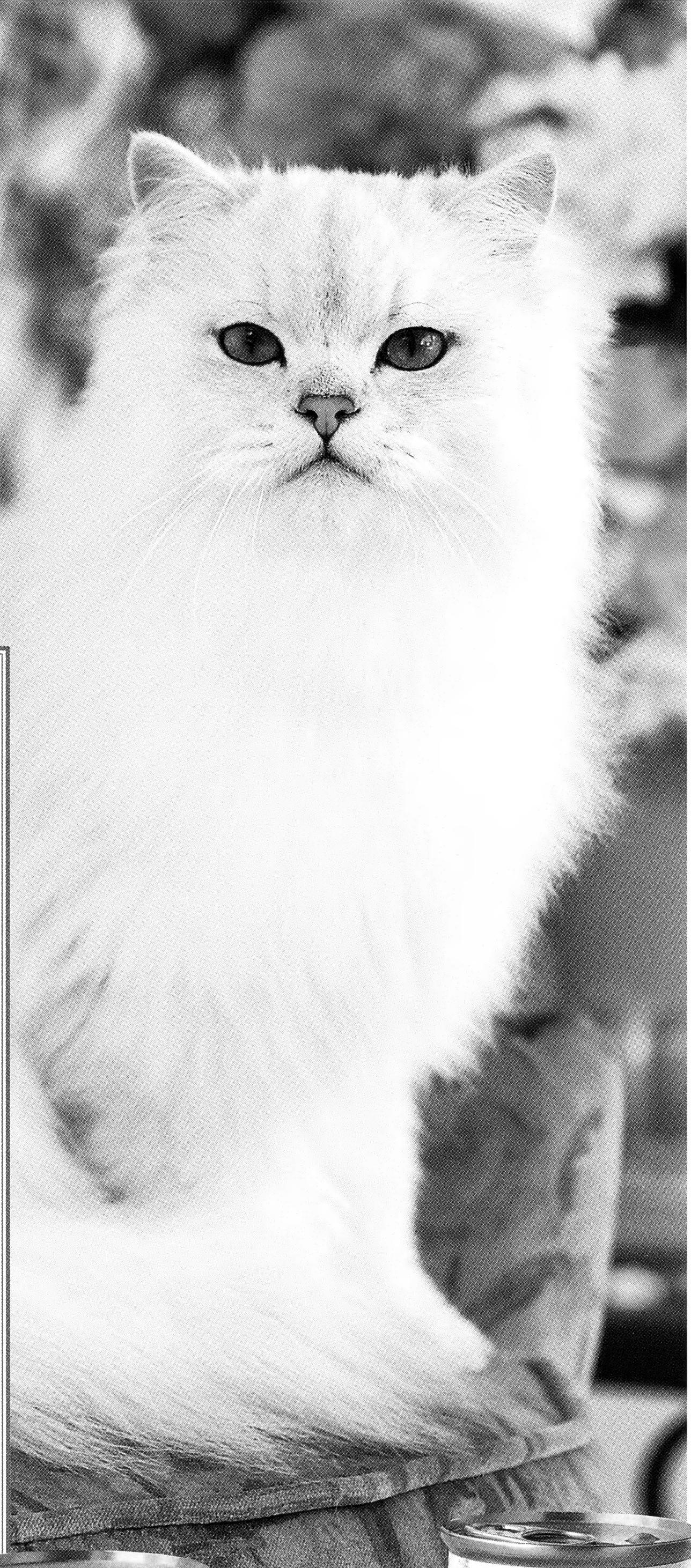


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Celebration of Wildlife in Art

Nature lovers at heart and conservationists by conviction, most wildlife artists gain their inspiration directly from the outside world. Whether they work in oils or acrylics, wood or metals, these artists strive to capture animals in their natural habitats, in natural lighting, and in realistic poses. Wildlife artists often highlight moments of action and suspense in their works, showing animals at their most free, energetic, and bold. And when they can't get to the savannas of Africa or the rainforests of South America, many artists find their inspiration—and their subjects—in zoos.

As lovers of wildlife and admirers of wildlife art, zoogoers also find themselves absorbed in the daily drama of nature. Interest in wildlife soon leads to recognition and awareness of the immediate dangers so many animals face today, with hunting and loss of habitat diminishing the numbers and quality of life of many species. The Zoo works to turn back what sometimes seems an inevitable tide of extinction with conservation and breeding programs, as well as educational programs aimed at wildlife enthusiasts of all ages.

In 1996, the Zoo again looks to art for help fulfilling this mission. From September 20 to 22 at the Zoo, the Friends of the National Zoo will present the second annual FONZ Wildlife Art Festival. About 100 artists, including those whose works are featured in the following pages, will present and sell wildlife art produced in a variety of media, from acrylics and watercolor to sculpture and photography. The incredible popularity of this now-annual event attests to the growing support and concern for wildlife on the part of the general public.

The FONZ Wildlife Art Festival exists not only to raise awareness of wildlife issues and celebrate the natural beauty of wild animals—it aims to support the Zoo as well. A portion of the proceeds from the FONZ Wildlife Art Festival will help fund endangered species education programs at the Zoo.

—Debra Solomon





Pacific Patterns; Terry Isaac
Courtesy of Mill Pond Press.

Arabian Oryx; Matthew Hillier



Sunbathers—Black-capped Chickadees; Terry Isaac
Courtesy of Mill Pond Press.



Snow Leopards; Larry Fanning



Fire and Ice; Jan Martin McGuire



Rain Forest Rendezvous; Rod Frederick
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Glossies; Ron Mayhew



Lion; Alan M. Hunt



Rhino Alert; Vince Valdez Studio



Belted Kingfisher and Mosquitofish;
Carel Pieter Brest van Kempen



Clowning Around; Suzie Zimos

LILY WHITEMAN

LIGHTS, CAMÉRA, WILDLIFE!

Ever wonder how wildlife filmmakers capture those magic moments? After all, animals are not actors that perform on the director's cue. And most creatures—agile masters of camouflage, equipped with finely tuned senses—are experts at making themselves scarce. "Even if you knew that a mouse ran through your kitchen nightly at eight o'clock, you would probably need weeks just to film your cat chasing it," teases Emmy-winning filmmaker Wolfgang Bayer. How then do wildlife cinematographers continually coax countless hours of footage from wild, elusive creatures?

"Our people do a *lot* of research," explains George Page, the producer and narrator of PBS's *Nature* series. This legwork often involves pumping scientists for ideas about telegenic animal action. Primatologist Christof Boesch, for example, once ended an interview with Peter Jones, executive producer of BBC's *Trials of Life* series, by casually mentioning recent revelations about how chimpanzee bands hunt colobus monkeys. So began a three-year-long quest for first-ever footage of such ambushes, which repeatedly took Jones and others through West Africa's tangled, sweltering jungles. Filmmakers also commonly tap knowledgeable locals for tips on wildlife whereabouts. Producer Lisa Truitt, for example, set the stage for a recent *National Geographic* documentary about arctic life by sleuthing out animal haunts with local Inuit hunters, who usually devote their tracking skills to shoots of a more deadly sort.

Many filmmakers conduct reconnaissance missions through the wild that, without targeting specific species, invite serendipitous encounters with ongoing action. Such ventures require a special ability to read subtle cues. It might, for example, be only a telltale mess outside an



Filmmaker Neil Rettig climbed 200 feet above the forest floor to capture rare footage of nesting harpy eagles.

© Neil Rettig Productions, Inc.

undersea burrow that marks the entrance of an octopus's lair, or the agitation of rubbernecking giraffes that betrays the presence of nearby lions. And thanks to a variety of innovative technologies, previously inaccessible habitats are currently hosting sweeping surveys. For example, special ultralight planes now lift filmmakers above the prohibitive dangers of unstable, but ecologically rich, shifting arctic ice sheets. "We would just fly, fly, fly and look for things," says Truitt, while describing how she snagged the first footage of feeding bowhead whales.

Other essentials for on-location shoots include good timing, long lenses, and what Page calls "the patience of Job." Such tools certainly helped BBC Executive Producer Mike Salisbury find and film the first spring foray of a polar bear family from its winter den. Methodically combing a Norwegian island, which had previously harbored hibernating bears, the filmmaker searched for "a plug of snow about the size of a manhole cover in the street." In the dim March light, "you could be 20 feet away from one and still miss it," says Salisbury. After six weeks of hunting, the filmmaker, at last, found a den. Though unsure whether this hideaway was still occupied, he nevertheless staked it out—watching, hoping, and shivering behind a concealing snow fortress that afforded telephoto views from a safe distance. After five days, the mother finally poked her head out and then tumbled out with three frisky cubs. "We wanted to jump for joy and throw things into the air to celebrate," Salisbury remembers. "Nevertheless, we had to keep quiet and still to get the sequence."

When closer footage is needed, how do filmmakers approach skittish subjects without disrupting the very behavior they seek to capture? Proving that discretion is the better part of valor, cinematographers commonly condition wildlife to their presence through gradually increased contact. Filmmaker Neil Rettig, for example, taught a family of territorial harpy eagles, which boast six-foot wingspans and huge talons, to ignore him by initially inching up to their treetop nest located 200 feet above the ground. Then, over the next several weeks, he gradually extended his



Filming a teeming seabird colony requires ingenuity and a fondness for heights.

cameo appearances in the canopy into completely tolerated 10-hour-long watches. Similarly, underwater specialist Michael deGruy has "spent weeks on the sea floor without filming, just waiting for populations to acclimate to me."

Not all encounters require such painstaking premeditation. For example, just minutes after commencing a search for Javan rhinos, Bayer stumbled onto a

handsome specimen—even though much of the only other footage ever obtained of this furtive creature had required a six-month-long pursuit. "Although my guides thought I could magically charm rhinos from the jungle, I was just fortunate," muses Bayer.

But on occasion, no matter what luck befalls filmmakers or what lengths they go to, choice sequences remain out of reach;



© Mike Salisbury

Mike Salisbury's colleague Hugh Miles braves the bitter cold and huddles in an ice fort while waiting for polar bears to emerge from their den.

A polar bear and her nine-month-old cub traverse arctic ice floes, but even in this remote landscape they cannot escape the photographer's eye.

some sequences are just too difficult or too dangerous to film as they unfold. Sometimes, nature needs to be nudged before she will hold her secrets up to the camera.

"You simply can't film some scenes without setting up," Page discloses without apology, but with critical qualification: "As long as we are telling the truth about how nature works without either hurting the animals or putting something over on the public, there is nothing wrong with setting up scenes. Although we have to be just as fair and accurate, standards for nature filmmaking are different from those of public affairs programs....We are showing people things they would otherwise never see." Page acknowledges, for example, that burrowing animals and hiving insects must still often be filmed in meticulously landscaped sets that are outfitted with special lighting and a glass panel for the camera.

Various forms of artifice may also be used to locate animals in the wild. Singing the same songs as birdwatchers, Rettig sometimes brings birds from the bush by imitating mating or territorial calls. Others have coaxed big cats from the shadows by planting alluring odors on trees. Marine specialists say that merely their comparatively clumsy swimming strokes can draw curious whales, dolphins, or sea lions into photo opportunities. And strategically positioned animal carcasses can bring down vultures for close-ups.

Filmmakers sometimes also tweak conditions to elicit certain natural behaviors from their wild subjects. For example, in order to encourage a group of chimpanzees to showcase their nut-cracking abilities for the camera, *National Geographic* filmmakers—guided by researchers—recently supplied the animals with nuts.

But even when the environment is perfectly stoked, herculean efforts may still be required to nail down desired shots. Such was the case when underwater specialist Howard Hall set out to film how horn sharks can literally escape the jaws of death. If snapped up, these feisty creatures win release by plunging their barbed spines into the interior of their captors' mouths. Assured by scientists that his sub-



© Neil Rettig Productions, Inc.

Filmmakers got close-up footage of bonobos in Zaire by choosing a site where scientists studying these elusive primates put out sugar cane to draw the animals in.

jects would remain unharmed, Hall tilted the predator/prey equation to the camera's advantage by repeatedly releasing horn sharks into an area teeming with angel sharks lying in wait for passing prey. Nevertheless, it still took five exasperating days before just one of the lurking predators finally snapped up and spit out a horn shark.

Not restricted to the field, the hidden hand of the nature filmmaker is also a force in the editing room. "Making one of these films is like building a Rolls Royce from the ground up," Page declares. "And how the scenes are put together is very important." For one thing, filmmakers often change the order in which events actually occur. A case in point: Bayer wove film shot over five different years into a portrait of winter in Yellowstone National Park that seamlessly and timelessly

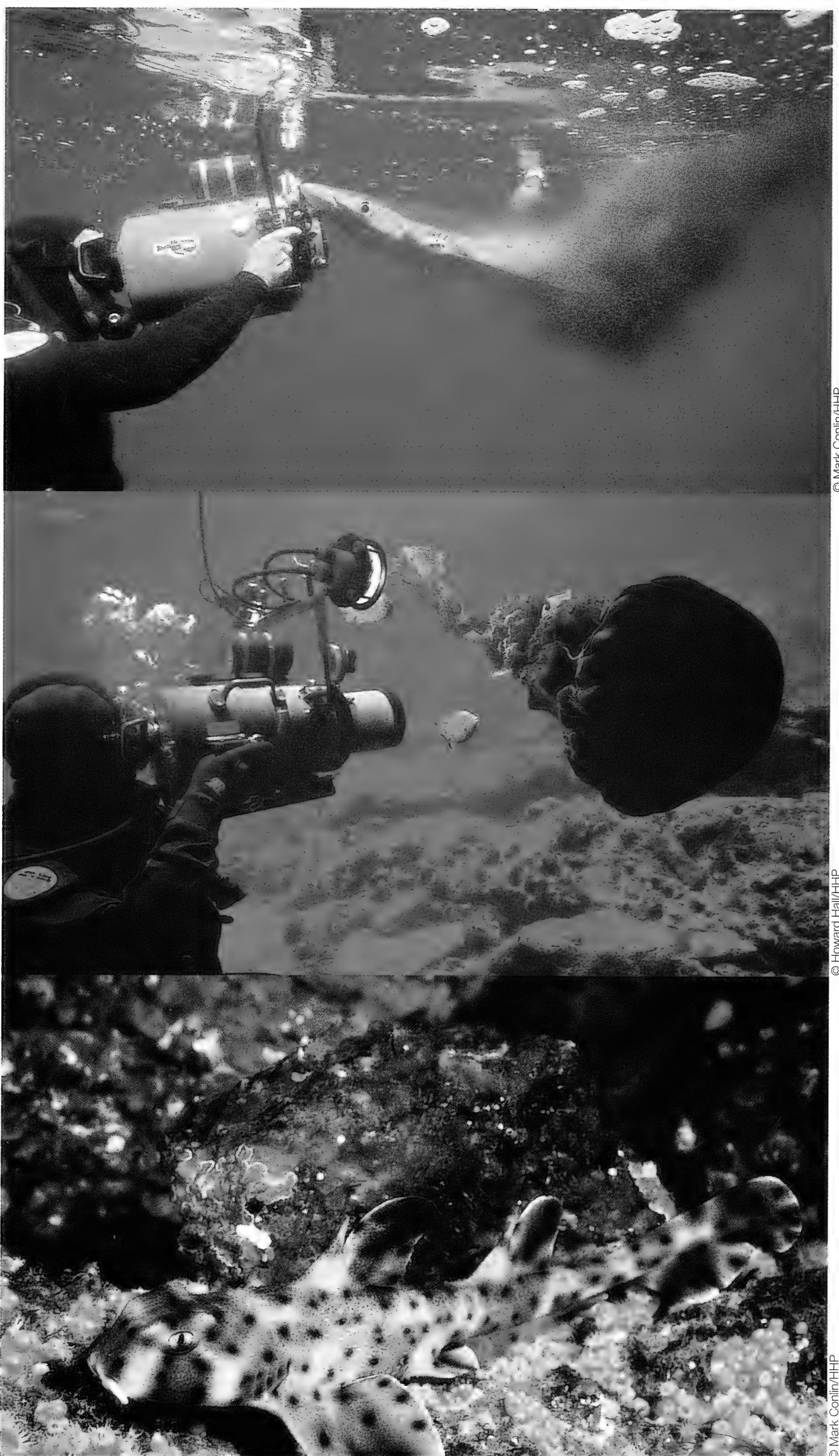
floats unanchored to any particular date. Filmmakers also often propel plot lines along by sequencing footage to imply that certain animals crossed paths when, in reality, never the twain did meet.

Body parts can also be mixed and matched on film. One way, for example, to dramatize distant chases is to periodically flash onto the screen close-ups of subjects' eyes or faces. But because obtaining head shots of wild animals on the run is often impossible, those of zoo cousins are sometimes used instead.

Filmmakers may also portray the plight of one particular animal with more than one individual. For example, a sequence that begins by showing an unsuspecting seal swimming below sea ice might end by showing a different seal in the clutches of a polar bear that hunts its prey by reaching through holes in the ice. "As long as

the action you are re-creating actually happened, and you are true to nature, it is fine to splice material in order to tell a compelling story. That's called good filmmaking," says Page.

But just what constitutes being "true to nature" is subject to interpretation. In a field that remains unbound by any Hippocratic-type oath, maneuvers embraced by some professionals are eschewed by others. Not even the use of lights for night shooting is a black-and-white issue. Purists, such as Tim Cowling, senior vice president of Discovery Channel Pictures, insist that illumination inevitably disturbs animals, and can spotlight prey that would otherwise go unnoticed by predators. In contrast, others contend that gradually increased wattage is harmless, and night lights are just as likely to warn prey of predators as vice versa.



Howard Hall uses his knowledge of animal behavior to safely film a blue shark swimming through a small swarm of krill and fish living amid the tentacles of a large jellyfish.

A baby horn shark can provide a rude surprise for predators like the angel shark.

Despite continuing controversies, reputable filmmakers do follow some unwritten rules. First, cruelty to animals is strictly verboten. Indeed, stunts requiring prey to be tied down or isolated with predators are universally condemned. "Creating situations that would not otherwise occur is lying to the audience," explains deGruy. "Moreover, it really hurts to see prey quivering in fear for their lives before predators. There have been times when I desperately wanted to film something, and if I had just changed something, it would have worked. But you can't do it; it's unethical." Nor would reputable filmmakers secretly substitute tame for wild animals or put together species that would never meet in the wild.

Such mores were commonly violated by early nature paparazzi such as Walt Disney and Marlin Perkins, who Bayer rates as "the worst offenders ever." Even Ray Disney has acknowledged that his famous uncle stooped to dropping captured lemmings into a river located more than a thousand miles away from the supposed site of the "mass suicide"—even though the featured variety never, as depicted, drown themselves. "Back then, nobody cared how wildlife scenes were obtained," remembers Bayer.

Does the hidden hand of today's wildlife filmmaker ever turn into a helping hand for distressed creatures? Page is often asked questions like: "Would you film orphaned cheetah cubs without saving them?" Page responds that most filmmakers strive to record nature without disturbing it. This approach is particularly important in national parks, where interference is illegal. But Page admits, with a twinkling smile, that he would find it "personally pretty hard to resist helping those cuddly cubs."

Lily Whiteman is a freelance environmental writer who lives in Washington, D.C.

RISKY BUSINESS



BBC Natural History Unit/© Jeff Foott

One of Patagonia's body-surfing whales makes a killing.

Danger is the constant companion of the wildlife filmmaker. Indeed, the hazards faced by these globe-trotting adventurers reflect the varied ways in which Mother Nature vents her wrath: Animal maulings, killer bee attacks, boat sinkings, exotic diseases, accidental falls, hypothermia, arctic strandings, and undersea avalanches account for just some of the near-death experiences recently endured by wildlife filmmakers—most of whom are blessed with a bionic ability to land on their feet.

But even the most resilient filmmaker must, for safety's sake, demonstrate deep respect for animals and an intimate knowledge of their behavior. Why? Because only after filmmakers understand their subjects can they position themselves for good shots without putting themselves in harm's way. And often the most important insights are derived from studious observation.

Filmmaker Michael deGruy, for example, once spent weeks on Patagonia's coast contemplating killer whales hurling their hulks onto the shore, snatching sea lions, and then—as casually as children kicking cans down the street—flinging their flailing prey out to sea. Eventually, the filmmaker realized that the whales targeted young sea lions to the exclusion of adults. Accurately predicting that these predators would distinguish between a grown man and a baby sea lion, deGruy then safely filmed a sea lion's-eye-view of the hunt while swimming near the charging behemoths. “This wasn't about reckless abandon; it was about preparation,” says deGruy.

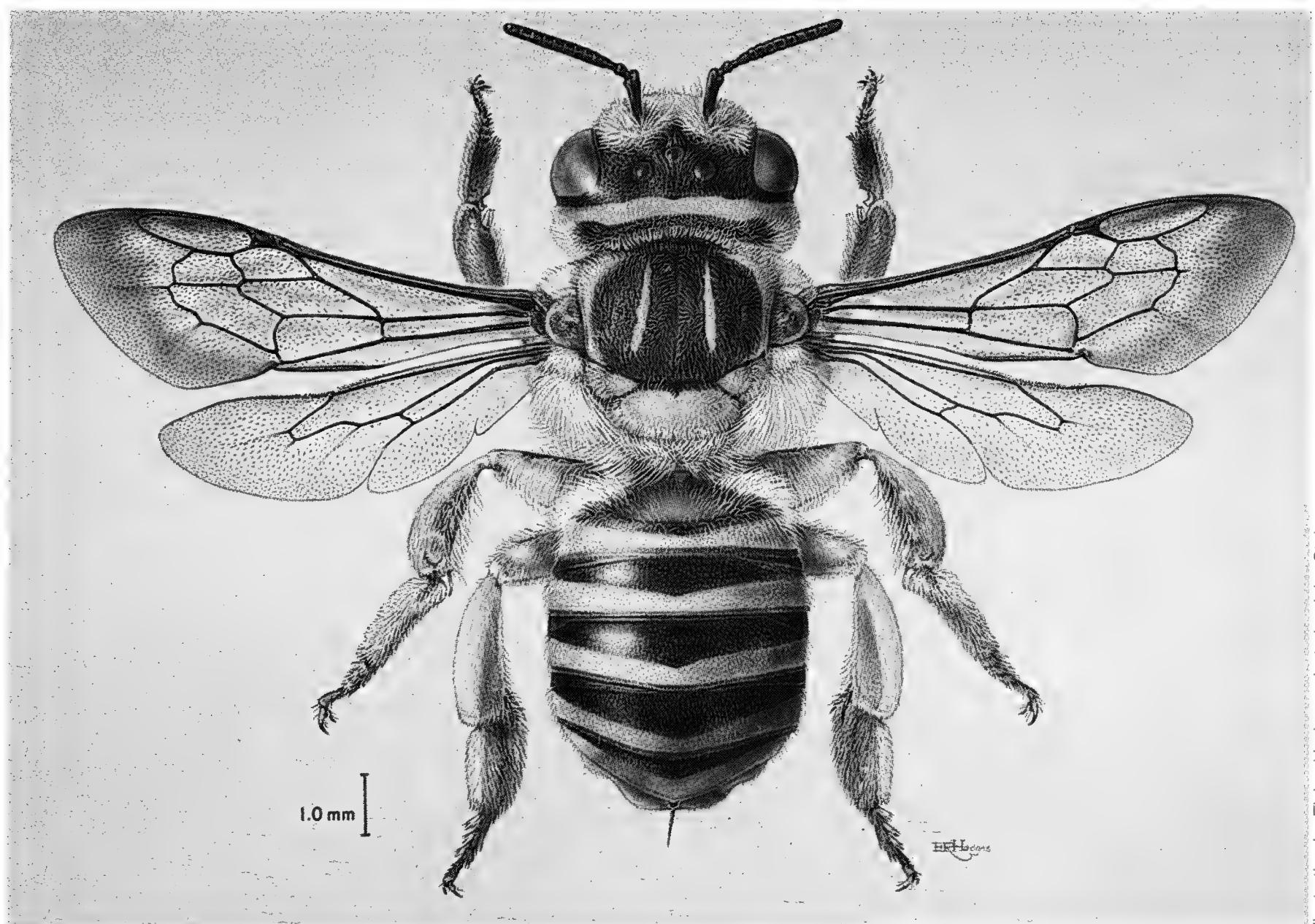
When filmmakers do overstep their bounds, fluency in the body language of wildlife can sometimes save the day. For example, recognition of a shark's “back off” message—conveyed by a nose-up/fins-down posture—could help forestall an attack. Similarly, swooping harpy eagles, which are intimidated by eye contact, can be deflected with head-on stares.

But despite the protective power of knowledge, on-location fatalities do occasionally occur. Since the early 1970s, one nature filmmaker has been killed by a charging elephant, another has fatally fallen from a hot air balloon, a third died in a glider accident, and a couple specializing in volcanoes perished in a Japanese eruption.

—Lily Whiteman

Art For SCIENCE'S Sake

Pamela M. Henson



The scientific illustrator has overall control of lighting and pose, and can combine multiple sketches and views into one stunning, accurate picture.

Take the elevator to the sixth floor of the National Museum of Natural History's west wing and you enter another world. In the Department of Entomology, row after row of cases store tiny, often beautiful, six-legged creatures. Step inside the office of Elaine Hodges and Young Sohn, and you will find trays of wasps and bees, microscopes, slides, dissecting tools, and what's this?: carbon pencils, crow quill pens, artist's brushes, scratch board, tracing paper. In many ways, the room looks

more like an artist's studio than a scientist's lab. In reality, it's a bit of both. Hodges and Sohn are scientific illustrators who produce the anatomical drawings of insects needed for natural history research and identification of insect pests.

While at first it may seem surprising to find artists working in a science museum, illustrators have been an important part of our study of the natural world from the days of cave drawings to today's computer labs, and museums and scientific

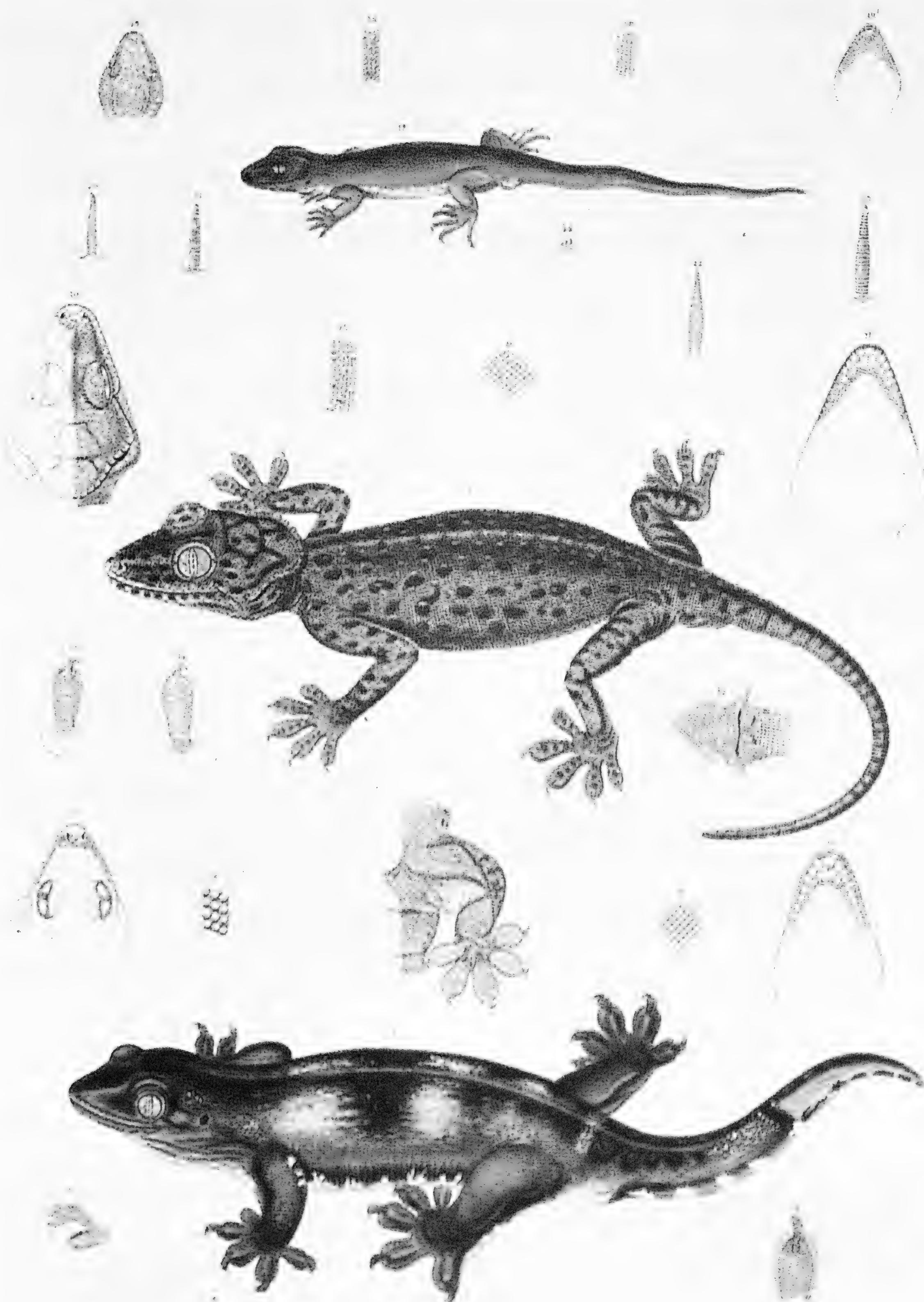
records would not be the same without them.

Scientists and artists both must have strong visual skills, and that is the tie that binds them. Both are trained to observe carefully, remember and analyze pattern and form, compare shapes and recognize differences. In addition, scientific illustrators must also master exacting scientific disciplines. But they do not have to check all of their aesthetic skills at the museum door, and their works are often as beautiful as they are informative.

Scientific illustration is the art of producing accurate, precise, and clear representations of specimens and environments important to science. A scientific illustration must capture the natural shape, proportions, and positions of important anatomical features, or "characters" as biologists call them. This is not always an easy task. A museum specimen has often lost the shape and colors it had when it was alive. A antler may be broken off at one end, a petal may be bent or folded, a wing may have dirt specks that cannot be removed without damaging its delicate structure. Using observational skills, scientific knowledge of the organism, and artistic talent, the scientific illustrator must produce a drawing of the organism as it once may have appeared—complete, undamaged, poised for action.

Scientific illustration has some special advantages over photography. The lighting of a photograph may distort shape,

Illustration by Elaine Hodges; photo by John Steiner



America's first global exploring expedition produced drawings of everything from distant cultural activities to these lizards, which appeared in the expedition's Herpetology.



A collection of Mary Vaux Walcott's accurate and artistic renderings of wildflowers was published by the Smithsonian.

emulsions may distort color, and the camera cannot fix crumpled, damaged, or discolored parts. But an illustration can avoid all of these problems, allowing us to see the shape and anatomical features of a specimen far more clearly.

The scientific illustrator must capture every detail precisely. For instance, an artist drawing a mosquito larva must count and carefully depict the animal's tiny head hairs because this character may tell us whether this specimen is harmless or a potential carrier of serious diseases. The illustrator must produce a drawing that helps the entomologist in the field determine whether or not a pond with larvae must be treated with pesticides.

Sizing Up Subjects

Scientific illustrators must produce drawings that fit on a printed page and are visible to the naked eye. This means they must enlarge the smallest and reduce the largest of the creatures they study. For example, an illustrator working on a triceratops skull reduces its size to fit on a page using a caliper or proportion divider to measure and outline the skull. This painstaking work results in a drawing that is smaller than the skull but retains the correct proportions.

How does the illustrator enlarge a tiny creature? Look again at Hodges' desk and you'll see her microscope doesn't look like the one you used in biology class. As Hodges explains, "This is a camera lucida, a device that uses a prism and mirror to project the image seen through the microscope onto paper, where the illustrator traces it." By using the camera lucida, Hodges and other artists can be sure that the animal's basic shape and its proportions are correct.

The artist also looks at the organism from many angles and produces drawings of many different pieces. The pieces are then enlarged and combined into a single drawing, which is reviewed by the scientist for accuracy. "Only after both artist and scientist are satisfied with the preliminary image is the final drawing produced," says Hodges.

Most scientific illustration is done in black and white, partly because few scientific journals can afford the expense of color. Black-and-white drawings also allow the scientists to easily compare anatomical features. Today's illustrators

use a variety of media and techniques, ranging from scratch board, carbon dust, pen-and-ink drawings, and watercolors to three-dimensional computer graphics.

Scientific illustrators don't just work inside museums, however, and they don't just produce drawings for scientific journals. Field drawings of plants, animals, and natural environments are an important part of scientific work. The field artist quickly sketches the many postures and movements of the organism, carefully recording its living shape and natural colors before the specimen is preserved. Nearby, a scientist records observations, such as where the specimen is found and by whom, and whether it is rare or abundant. Field notes, photographs, and drawings help make a museum specimen valuable.

Picturing a New World

Drawings have been an important part of field work for centuries. After the discovery of the New World, scientists were eager to learn about the unusual creatures explorers had found. They wished to describe these new species and classify them in the grand *Systema Natura* or system of nature proposed by Swedish taxonomy pioneer Carolus Linnaeus in the seventeenth century. But all a scientist might have had to work with was a field sketch, some hurried notes, and perhaps one damaged and desiccated specimen from a distant land.

European scientists eagerly sought specimens, descriptions, and drawings of new species of plant and animals, and dedicated artists stepped up to meet their demands. One of the earliest American illustrators was John Abbot (1751-c. 1840), who left England and settled in the New World in 1773. Living first in Virginia and then in Georgia, Abbot supported himself by recording the birds and insects around him in watercolors and selling his paintings to wealthy patrons back in England. He sent thousands of his drawings and specimens back to his homeland where they were studied by naturalists and reproduced in scientific volumes. Abbot's watercolors may have seemed primitive in comparison to the work of some of his European colleagues, but for naturalists they provided a precious window through which people back in Europe could glimpse a new world of

nature.

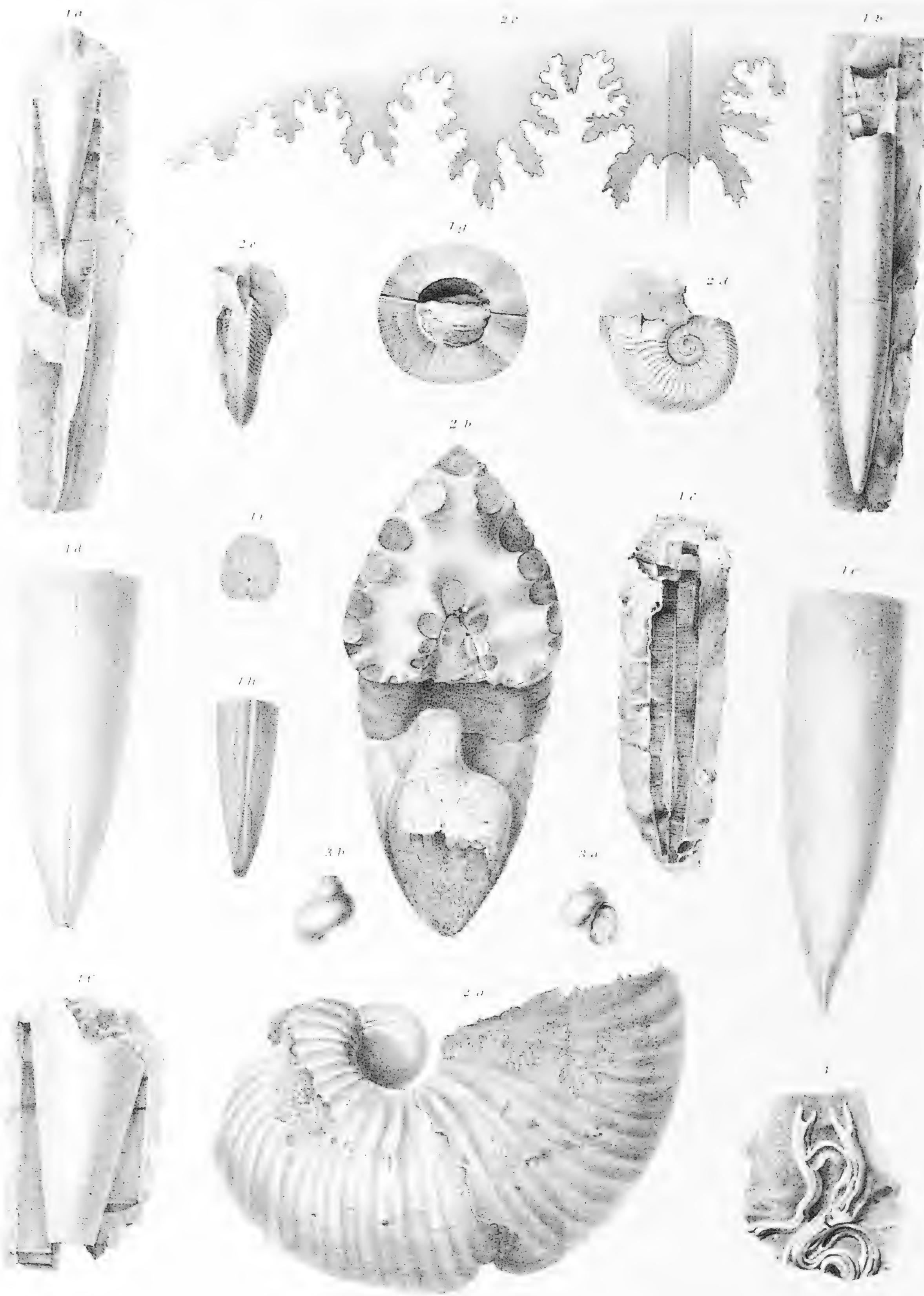
After the turn of the century, the flora and fauna of the New World became familiar to lovers of science and art alike through the work of John James Audubon (1785-1851). Audubon took up his paintbrush in 1819 after a series of business failures along the western frontier. He set about capturing in watercolor and pastel the animals he observed and hunted in North America. In 1826 Audubon, who had been born in France, returned to Europe to begin an ambitious multi-volume printing of his drawings. He personally oversaw the engraving, coloring, and publishing of his plates in England.

Part showman, part naturalist, part artist, Audubon cultivated his image as a frontiersman, and courted wealthy patrons. Audubon's dramatic portrayals of American wildlife departed from previous work by telling a story about the animals. Audubon's birds particularly caught the imagination of his European audience. Most birds were dramatically depicted, shown defending their nests, feeding on corn or berries, clutching prey in their claws, and in other poses. Many of Audubon's works seem to borrow as much from the tradition of game painting as from scientific illustration. In his day, neither the art nor the scientific community was entirely comfortable calling him its own. But a century and a half after publication of Audubon's *Birds of America*, he continues to influence artists.

An American Science

While Audubon was preparing his lavish plates primarily for a European audience, American naturalists and politicians felt the need to establish American independence from Europe in scientific matters. When the United States sent out its first global exploring expedition from 1838 to 1842 under the command of Lt. Charles Wilkes, it included a staff of naturalists and artists.

The talented artist-explorers of the United States Exploring Expedition produced hundreds of drawings of distant cultures, foreign landscapes, and exotic plants and animals from the far reaches of the globe. Joseph Drayton (died 1856), an experienced engraver from Philadelphia and one of the artists sent on the voyage, produced quick field sketches that captured the living colors and shapes of tiny



Smithsonian Institution Archives

These fossilized mollusks were drawn for the U.S. Geological Survey by paleontologist and artist Fielding B. Meek.

mollusks, jellyfish, fish, and frogs. To save time in the field, Drayton often sketched the outlines of the whole animal but colored only a small part as an example. His field sketches and notes were used by John H. Richard (born c. 1807) to produce the magnificent plates for the expedition's *Herpetology*. The expedition's multi-volume report went a long way toward bringing the scientific publishing standards of the United States up to par with those of Europe.

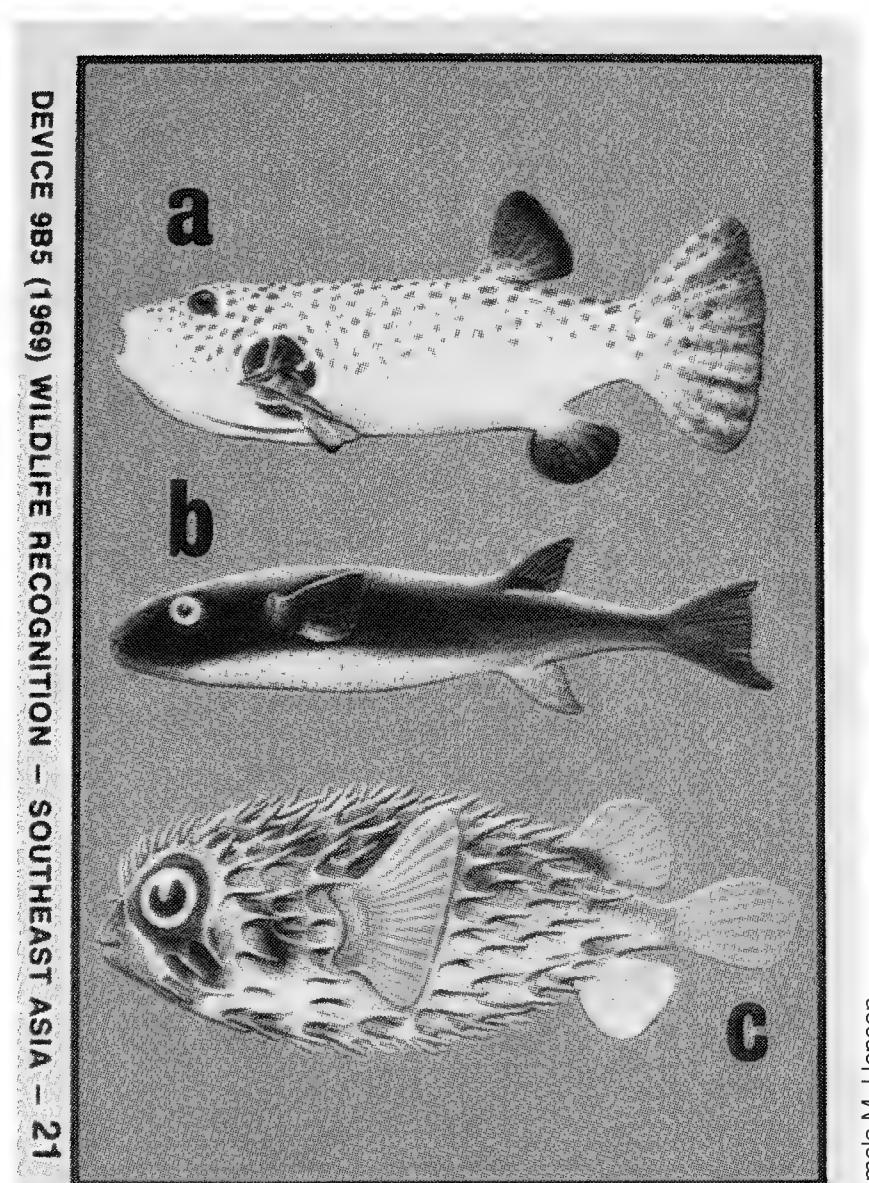
Go West, Young Man

All through the nineteenth century, private and government exploring parties surveyed and mapped the North American frontier as they moved farther and farther west. Artists and photographers sent along on these expeditions captured the magnificent vistas and geological formations of the West, providing the world its first glimpses of the Rockies, the Grand Canyon, and Yellowstone. Some of these artists mastered the new art of photography as well to capture these new vistas, but photographs could not fully capture the depth or complex relationships between features in a western panorama.

The West was also rich in the remains of ancient and extinct creatures of great interest to science. Expedition artists sketched the strange fossilized creatures found in rock outcroppings and uncovered below the surface. Fielding B. Meek (1817-1876) accompanied several of the Hayden expeditions to Missouri and the badlands of Nebraska. Equally talented as an artist and paleontologist, Meek both wrote the text and prepared the plates for United States Geological Survey reports. Meek's carefully crafted plates show the entire animal as well as cross sections and anatomical details. Many of Meek's plates were produced while he was living in the Smithsonian Castle on the Mall, one of a group of young explorers who quartered there while not in the field.

Showing Us the Beauty in Nature

The fossil beds of Canada later drew paleontologists such as Charles Doolittle Walcott to the northern Rockies. First as head of the U. S. Geological Survey and later as the fourth Secretary of the Smithsonian, Walcott traveled north annually to collect an array of strange creatures, unlike any



This military flash card depicts dangerous porcupine and puffer fish of Southeast Asian waters.

ever seen before, in the Burgess Shale formations. His wife, Mary Vaux Walcott (1860-1940), assisted him in the field, but also turned her artistic eyes to other life forms: wildflowers. Their tent became her atelier, as she captured natural colors and shapes while still in the field. In 1925, her *Wild-Flowers of North America*, a five-volume set of prints from her original watercolors, was published by the Smithsonian using a new printing process designed to produce large runs of high-quality prints. The 400 plates captured the beauty of our native flora, from sweet pea to rose, and awakened interest in these beautiful plants among another generation of plant collectors.

Mary Agnes Chase, a botanist with the U.S. Department of Agriculture (USDA) from 1903 to 1963, used her talents to educate the public about her favorite group of plants, grasses. Chase began her career as a scientific illustrator, a route she and many other women used to enter the science community. Chase studied on her own at night, and became honorary curator of the National Herbarium and the world's expert on grasses. Much of her work for the USDA was practical—identifying seeds to ensure that agricultural products were of high quality and describing and classifying new species. Chase was passionate about grasses, and she shared her love of these common but highly diverse plants in her *First Book of Grasses*,

designed not for the scientist but for the amateur botanist. First published in 1922, her *First Book of Grasses* remains in print today.

Over the years, scientific illustrators have been called upon to provide field guides for more than the weekend naturalist. During World War II, illustrators helped to prepare *Survival on Land and Sea*, a pocket-sized manual distributed to a million servicemen to help them survive if they were downed or separated from their units on foreign soil. This tradition has continued on in the form of flash cards, which are illustrated with paintings of animals to show which are dangerous and which may be useful, and plant diagrams that warn of poisonous parts, point out edible portions, and identify sources of life-sustaining fluids. The drawing of parts must be clear and simple, but also precise, so a non-scientist will not confuse similar species in cases where one is poisonous and another is edible.

Tools of the Trade

Today's illustrators have many more tools available to produce and disseminate their drawings, while computer technology makes many images easily accessible. A CD-ROM on fruit flies, for example, contains hundreds of drawings of these agriculturally important pests that inspectors can use when checking plant shipments. Computer technology is also allowing us to look at organisms in a new way. Three-dimensional scanning technology now allows illustrators to build multi-dimensional models of animals and plants, images that can be rotated and viewed from many angles.

But whether artists use ink on paper or a computer mouse, the basic challenges of scientific illustration remain the same—to produce clear, accurate, and well-composed images of life forms. As scientists continue to explore the biological diversity of the tropics and minute characters visible through high-powered microscopy, scientific illustrators will be there to help scientists and the general public see the natural world through artists' eyes.

Pamela M. Henson is a historian at the Institutional History Division, Office of the Smithsonian Institution Archives and co-curator of the exhibit "Eyes on Science: Illustrating Natural History" at the National Museum of Natural History.

AT THE ZOO

SOUTHERN AFRICA'S SOCIAL DIGGERS

Walking through the Small Mammal House you may hear excited voices exclaiming that they have spotted Timon from the *Lion King*. These children (and frequently adults) have recognized the slender-tailed meerkats (*Suricata suricatta*), or suricates as they are sometimes called, from the popular movie in which one is featured as a care-free drifter that travels with a warthog. The animals' slender legs and silvery-brown, coarse coats are helpful at making this recognition, but it is undoubtedly their distinctive black eye patches and manner of sitting upright on their hind legs that gives away their identity.

This upright position might cause some to imagine that the meerkat is a type of prairie dog. In fact, this animal is not a rodent but a carnivore, and more specifically a mongoose, cousin to the dwarf mongooses (*Helogale parvula*) that also live in the Small Mammal House.

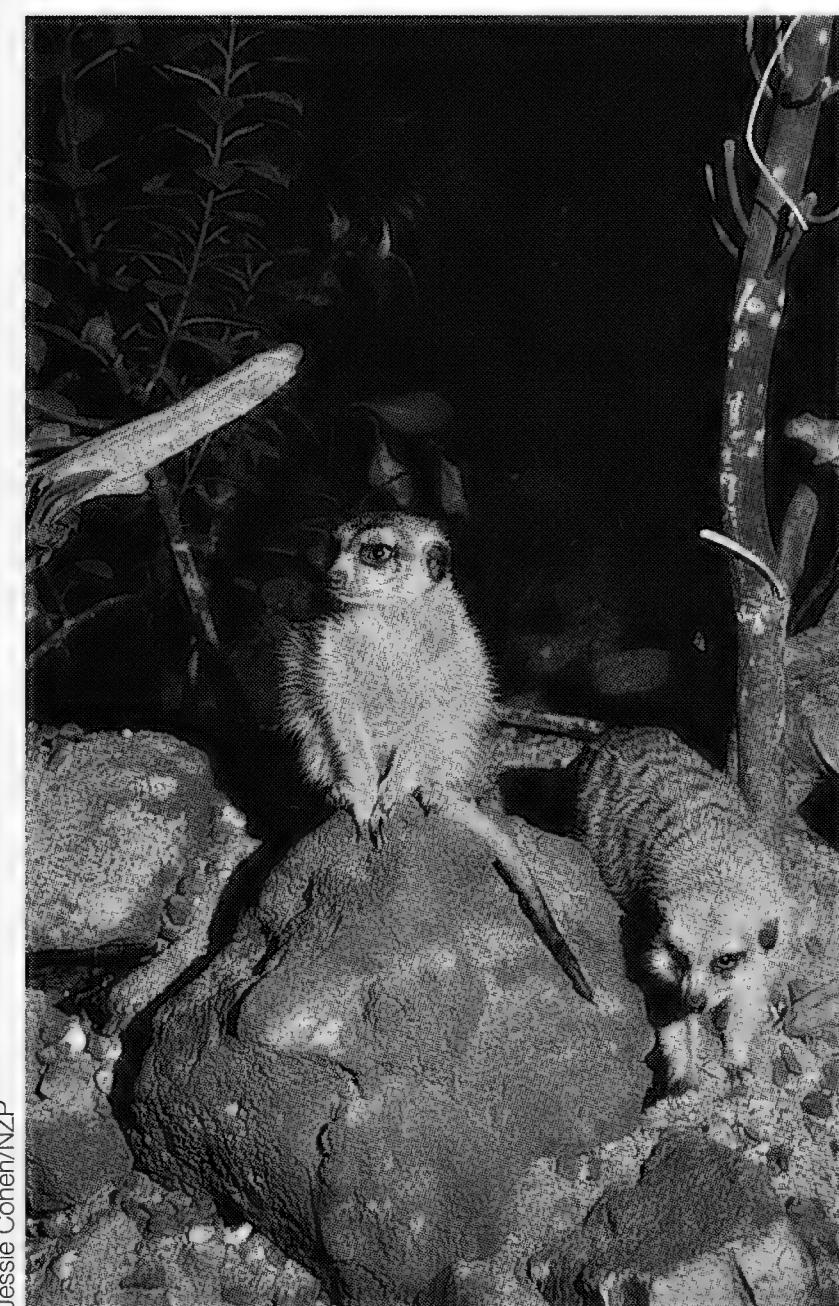
Meerkats live in the arid and savanna regions of Angola, Namibia, Botswana, and South Africa, and they occupy the driest habitat of all of the mongoose species. As communal burrowers, they either dig their own burrows or share burrows with African ground squirrels and yellow mongooses. Their home ranges generally include five burrow systems, or warrens, that they occupy in rotations of

months or even years. Though warrens are often small and simple, with a few entrances, larger ones span areas up to 27 by 35 yards, and have as many as 90 entrance holes.

The Zoo's meerkats are relatively new to their current enclosure, a large exhibit that is almost entirely surrounded by glass. They lived in what is now the elephant-shrew exhibit, but this exhibit's flat, even terrain left the meerkats little opportunity to actively explore their surroundings. As a result, they often paced the limits of their enclosure. Before introducing the meerkats to the new enclosure, Zoo keepers completely changed the substrate, and it now contains a rocky and sandy terrain, similar to that found in meerkat habitat.

Meerkats have an incredibly diverse diet in the wild that includes many types of insects, and some lizards, birds, small snakes, and mice. Zoo keepers attempt to provide similar diversity by feeding the meerkats mealworms and crickets along with various types of meat. Unlike Timon in the movie, meerkats forage for their food in groups or pairs, and increase the chance of finding food by taking a different route every day. They find most of their food by digging among roots and under stones. At the Zoo, these activities, along with their tendency to burrow, mean that they turn over a lot of dirt throughout the day.

Small Mammals Animal Keeper Cathy Yarbrough placed rocks beneath the substrate throughout the exhibit to prevent the meerkats from burrowing too deeply. A buried T-configuration of PVC pipe provides a burrow for them beneath the sandy substrate, thereby reducing the necessity of burrow digging. Nonetheless, the meerkats still actively dig, which prob-



Jessie Cohen/NZP

Constant diggers, meerkats keep their keeper on her toes.

ably helps to keep their claws short, and early-morning visitors to the Small Mammal House can see Yarbrough daily attempting to fill in holes with substrate, followed by the meerkats undoing her work.

Meerkats, which live in groups of three to 30, are among the few carnivores that are highly social. Group-living may offer meerkats better defense against predators because, as a group, they can dig a more elaborate system of burrows with many entrances to escape danger. In addition, some group members act as sentinels when the group is foraging, standing on their hind legs to watch for predators and producing a warning call if they sight one. Another intriguing aspect of cooperative behavior among meerkats is that non-reproducing pack members act as helpers to guard and provision other meerkats' young.

On the other hand, despite their otherwise cooperative behavior, meerkats compete for food; at the Zoo their feeding areas are widely spaced to avoid this problem. This food competition places a selective pressure on meerkats that they would not likely experience if they were solitary animals. Meerkats have been recorded teasing their offspring with food to encourage them to fight over it. This behavior may be a mechanism to cope with the selective pressures of sociality.

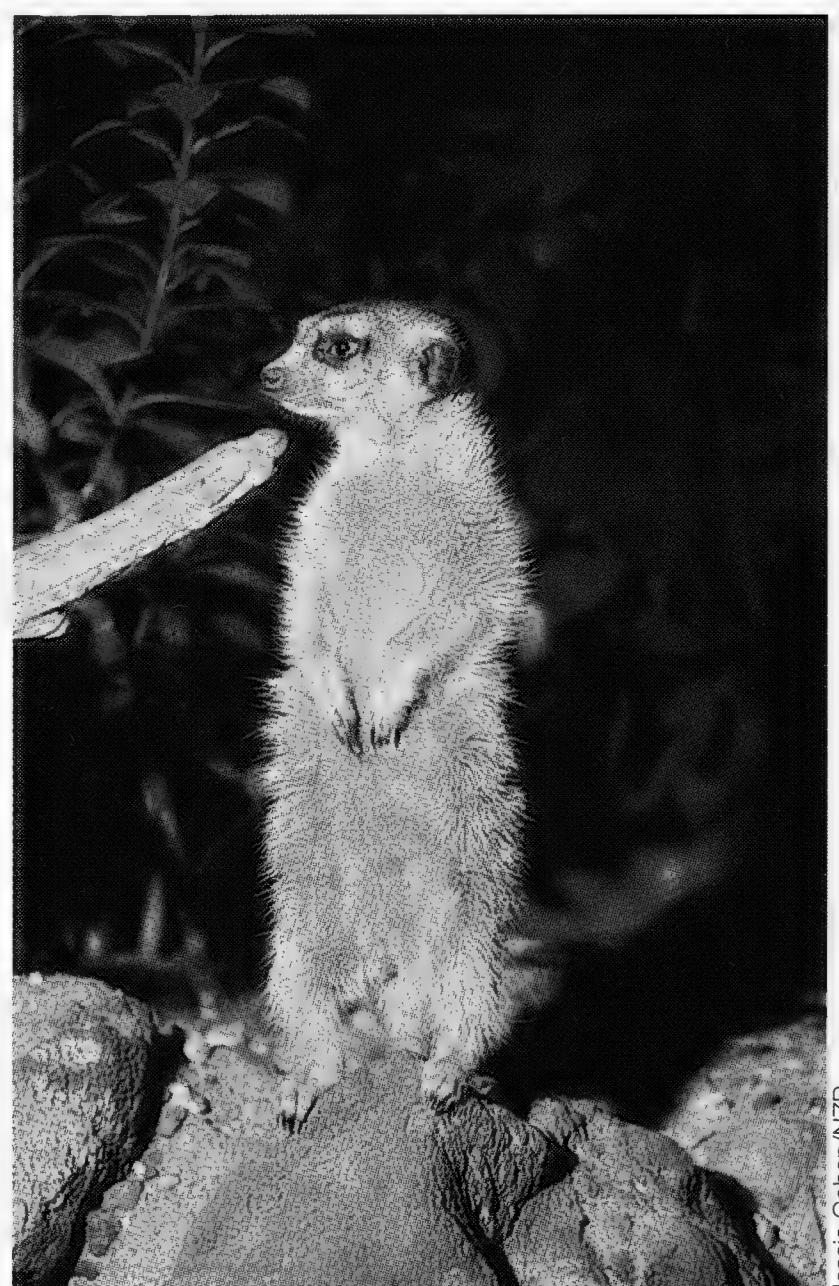
Unlike many other social animals, including the dwarf mongoose, meerkats do not appear to establish a linear hierarchy of individuals, and more than one pair breeds during the annual breeding season. The sexes do not have extremely different appearances, but the females are sometimes larger than the males and seem to be the dominant members of the group. Males appear to coexist quite well with

one another, but when a female reaches sexual maturity, she is usually banished from the family.

The complexity of the meerkat social system, along with the animals' tendency to be highly aggressive toward non-pack members, has made the task of integrating groups of meerkats extremely challenging for Yarbrough and Associate Curator of Mammals Bill Xanten. After the death of a male meerkat at the National Zoo in January of 1994, the female here was left alone. Yarbrough had to find creative means of getting the lone meerkat to eat because, without a companion to watch for potential predators, she was extremely nervous during feeding times.

Fortunately, two male siblings, named Fred and Barney, arrived from the Philadelphia Zoo in December of 1994. The Philadelphia males and the National Zoo female, named Pebbles, have now formed a tight social group. They are extremely active, and you can watch them foraging for food, resting, and grooming together. Stop at the meerkat enclosure to admire the likable creatures of *Lion King* fame. Once there, you may find watching their various social activities even more entertaining than the movie.

—Kasey McCracken



Jessie Cohen/NZP

NOTES & NEWS

It's Not Too Late to Cook with the Masters

There's still room for some lucky cooking students to enroll in the "Culinary Classes of a Lifetime," a series of fall classes (beginning September 27) held at Bethesda's L'Academie de Cuisine on Fridays. Don't miss the chance to be taught by ZooFari master chefs Jean-Louis Palladin, Roberto Donna, Francesco Ricchi, Mark Furstenberg, Ann Amernick, and Larbi Dahrouch. Tuition costs \$1,000, of which \$950 is tax deductible. Proceeds benefit the National Zoo. Call 202.673.4961 for information or to sign up.

Fall Events Calendar

The mild days of fall are among the best days to visit the Zoo—peak-season tourist crowds are gone, and balmy, muggy days give way to blue skies and pleasant temperatures. Below is an offering of fine fall events, all of which you're invited to attend:

FONZ Wildlife Art Festival

September 20, 21, 22

September 20

Patron Preview Party and Auction (tickets required)

Wildlife Art Festival (free; 10 a.m. to 5 p.m.)

September 21

Vintage Evening (wine tasting; tickets required)

About 100 wildlife artists and photographers will be on hand to demonstrate, discuss, and sell their work. Other activities include photo workshops, art demonstrations, a Paint-a-thon in the Park, the Kids' Creation Station, and an ethnic food bazaar.

The Patron Preview Party and Auction is a chance to purchase and bid on wildlife art, sculpture, and photography. The Vintage Evening offers wine tasting from 15 vineyards, food, and chances to talk with attending artists. For tickets for these two events, call 202.673.4961.

Fiesta Musicale

September 29

The Zoo's celebration of Hispanic Heritage Month combines lively music and dance, delicious food, and animal demonstrations, a recipe that adds up to a fine fall day at the Zoo.

FONZ Annual Meeting/
Zoo-by-night Tour

October 11

Catch up on FONZ progress in 1996 and share a look ahead at what next year has in store. Then snap on your flashlight for the annual nocturnal tour of the Zoo.

Running Wild
at the National Zoo

November 2

Saunter or trot through the park, and help Zoo endangered species education programs. FONZ's annual 5k is the best way to run wild. Call 202.673.4954.

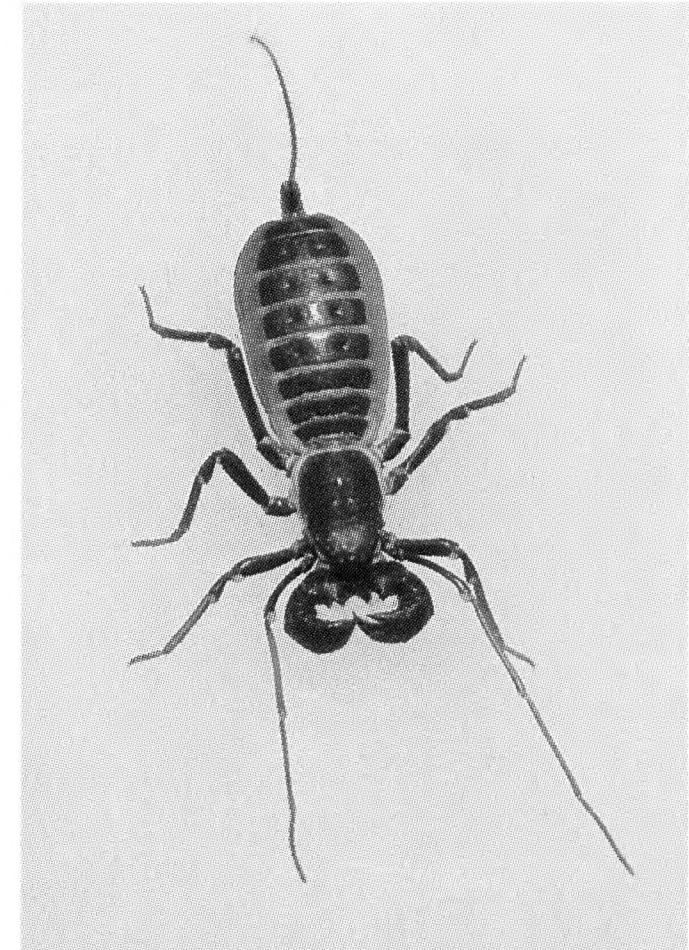
Zoostravaganza at Fair Oaks

November 16, 17

Reggae, steel drums, stilt walkers, Santa's debut, and free photos for kids will be among the entertaining highlights of this year's Zoostravaganza, which also marks the launch of the activity-filled FONZ Creation Station in Fair Oaks.

Animal Shorts

Here are some quick takes on animal news from around the Zoo: As this magazine went to press, the Zoo's two female greater one-horned Asian rhinos, Mechi and Kali, were expected to give birth to young sometime between late August and the middle of September. In bird news, the Outdoor Flight Exhibit has some new residents, including California quail and ring-necked pheasants. The Invertebrate Exhibit is happy to exhibit once again a vinegarone, a large whipscorpion that has proven popular with visitors.



Jessie Cohen/NZP

NOAHS: Ten Years Protecting the Ark

This year marks the tenth anniversary of the founding of the Zoo's NOAHS (New Opportunities in Animal Health Sciences) Center. Since 1986, the NOAHS staff—which includes scientists specializing in genetics, veterinary medicine, and reproductive biology—has strived to save endangered species by working with both wild and zoo animals. Among NOAHS' breakthroughs was the first birth of a cheetah through artificial insemination. NOAHS scientists also take time to reach out to local schoolchildren at several Washington, D.C., schools.



The Good News...

Biologists working to reintroduce endangered whooping cranes in Florida have reported the first successful pairing of their 57-bird flock. While they do not yet know if the coupling has produced a fertile egg, they expect more pairings as the flock grows older.

In a joint project run by the U.S. Fish & Wildlife Service and the Florida Game and Fresh Water Fish Commission, the whooping cranes, members of one of the most endangered species in North America, first arrived in Florida in 1993 as a flock of 14 chicks. Raised in breeding programs in Wisconsin and Maryland, the tall white birds live in tents for several months before they have adequate skills to fly free on the Three Lakes Wildlife Management Area and adjoining cattle ranches. This year has been the project's most successful to date; in addition to the pairing, the project has also seen a very healthy population of newly released cranes. Whereas project directors have previously seen mortality rates ranging up to 60 percent among the cranes, they have lost only three birds from the flock of 43 released last year, a mortality rate of just seven percent.

—*Tom Palmer, New York Times Regional Newspapers; and U.S. Fish & Wildlife Service*

...The Bad News

The white abalone (*Haliotis sorenseni*), a shellfish historically found in the waters around southern California and Baja California, may be nearing extinction, reports a new study. Although it is rare for marine invertebrates to face extinction, the extensive harvesting of white abalones for their tender and tasty meat has led to a severe shortage of these animals.

The effects of overharvesting may be compounded by the way abalones breed. Abalones require high concentrations of sperm, and thus, high numbers of adults, for egg fertilization. As population densities decrease, so does fecundity. Following massive harvests in the 1970s, a disease or some other environmental hazard may have acted as the final blow to the depleted abalone populations. Today, only a small number of adult abalones linger on; even fewer young animals can be found. While some limited regulations are already in place in California to protect the white abalone, new ones may be needed throughout the white abalone's range to prevent the shellfish's demise.

—*Trends in Ecology & Evolution, July 1996*

Drive-through burgers, tacos, fried chicken...recycling?

In an attempt to make recycling quicker and easier for the average Joe and Jane, Ecology Action of Texas, Inc., recently opened the country's first full-service drive-through recycling drop-off in Austin, Texas. Instead of unloading and sorting their cans, bottles, and newspapers themselves, now people can just pull up to the recycling drive-through and uniformed volunteers will unload the recyclables, sort them, and send the customers on their way.

While the city of Austin already has a curbside recycling program, it serves only single family homes. Ecology Action has created this innovative, free drop-off to appeal to apartment dwellers and families living in multiple-family homes. Even some families that live in single-family homes have started to use the drive-through, since Ecology Action accepts some recyclable materials, such as office paper and cardboard, which the municipal curbside program does not.

Ecology Action volunteers say that the drive-through has really caught on. Inspired by the popularity of this first venture, they have plans to open more drive-through drop-offs in neighborhoods all across the city.

—*E magazine, June 1996, and Ecology Action of Texas, Inc.*

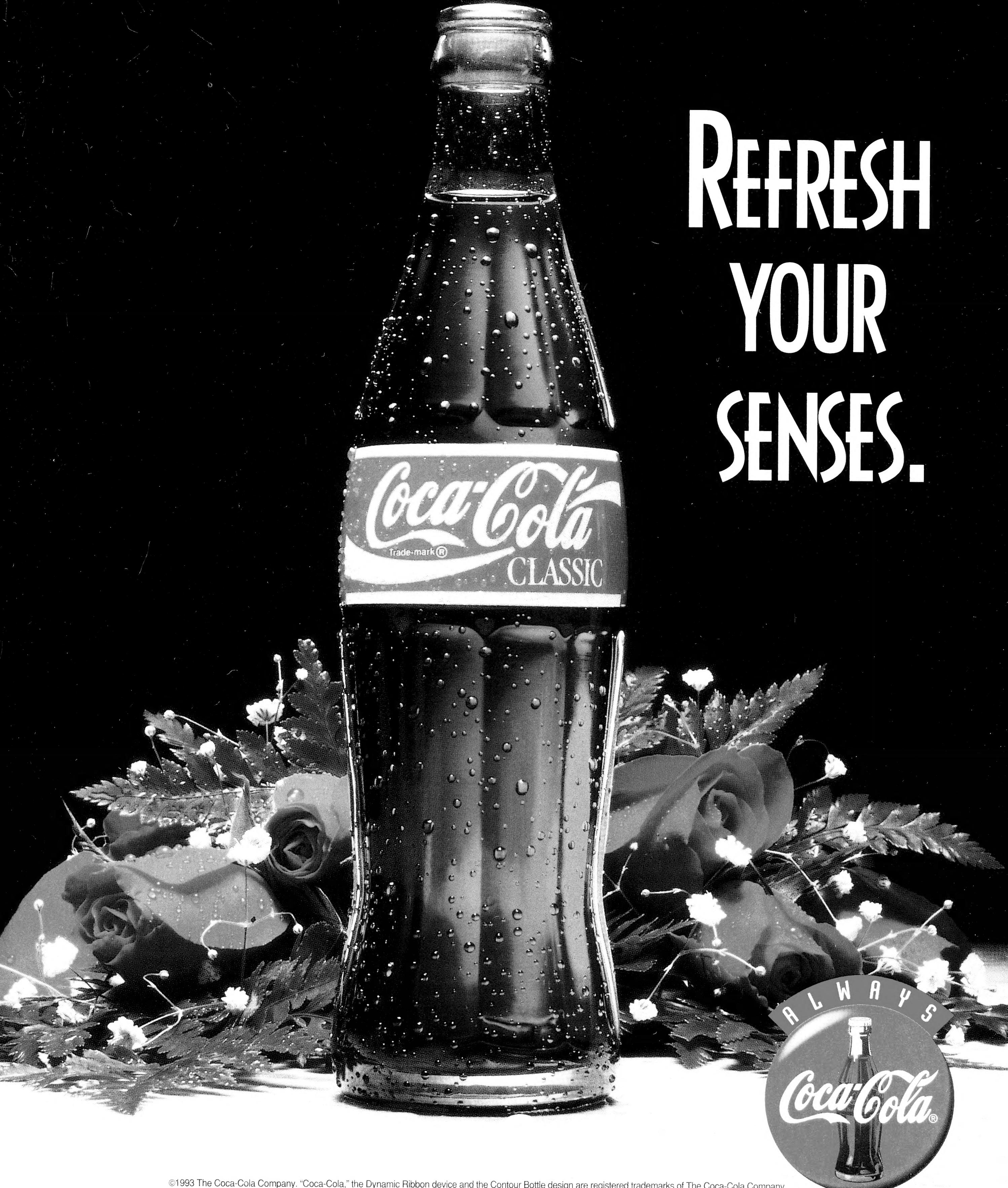
What's in a Name?

As members of the hawk family, kites are known for their graceful, soaring flight and their sudden swooping movements. They are distinctive also for their ability to hover in the air, legs dangling, as they await their prey's next move.

With their quick, darting movements, kites very much resemble the paper and silk creations we also know as kites. In an effort to follow and grab its prey, a kite may often have to turn completely around in the air, seeming to twist entirely with the willful gusts of wind much like a kite at the beach. But which was called a kite first, the bird of prey or the child's plaything? The origins of the word kite seem to lie in the Aryan root *skut*, meaning to shoot or go swiftly, and the use of the word kite to describe a type of bird dates back to A.D. 900. The second meaning of the word kite, referring to the ancient Chinese creations also known as Flying Paper Birds, dates from the seventeenth century.

—*Compiled by Debra Solomon*

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